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a moment, and suppose an observer on Mars were to examine the earth with successive increasingly powerful telescopes. The first artificial production that he would probably be able to see would be some of the great grain-fields of our Western States. These he would find of irregular shape, but bounded more or less by straight lines. They would appear of a greenish color, not very different from that of our oceans; and he would find them subject to great changes at certain seasons, sometimes perhaps entirely disappearing from sight, when of the same tint as the surrounding country. In fact, if an observer were placed on Mars, and furnished with one of our more powerful telescopes, he would see just about as much of our grain-fields as we do of their stripes, and the only noticeable difference between the two would lie in their shape. Indeed, assuming an artificial origin, it would be easy to frame hypotheses accounting for their form, dependent upon the peculiar conformation of the land surface of Mars, or for their radiating in several instances from particular points as centres.

But to return to our hypothesis, that the stripes are of vegetable origin. If it is correct, there is one test to which it must submit. If a change is noted in a given stripe, this change should be in general more or less progressive from the equator towards the poles, or *vice versa*. I say in general, because it is not probable that the same kind of vegetation would exist all the way from the equator to 50° north or south latitude, nor would it be the same in all stripes having the same latitude. Moreover, in the stripes running east and west, or in those situated near the equator, successive changes would not usually be noticeable. Stripes containing the same kind of vegetation should be similarly affected. Now, in the stripe known as Hades, previously referred to, this very phenomenon was observed. Hades runs in a direction nearly north and south, and extends from latitude 20° to 45° north. The observation in question was made about two and a half of our months after the passage of the northern solstice on Mars. It was therefore in the latter part of their summer when it was found that the southern portion of what had but a few weeks before been a well-defined stripe had completely disappeared.

As an illustration of the formation of a stripe running from the equator towards the pole, let us take the latest observations of M. Perrotin (*Comptes Rendus*, cvii. 161). According to these observations in the regions as far north as between latitudes 50° and 60°, the stripes did not appear this year until June 4, or four months after the summer solstice. Unfortunately, Mars is now getting so near the sun that it will be probably impracticable to determine the date of their disappearance, should they be found later to have vanished.

WM. H. PICKERING.

Observatory, Cambridge, Mass., Aug. 9.

The Philippine Islands.

MR. WALLACE, in his great work, 'The Geographical Distribution of Animals,' divides the Oriental or Indian region of Mr. Sclater into four sub-regions, of which Java, Sumatra, Malacca, Borneo, and the Philippine Islands form one, which he calls the Indo-Malayan. In his discussion of the Indo-Malayan sub-region, Mr. Wallace recognizes several subdivisions of it, and treats of the Philippine group as one of the most important of these. Though acknowledging the existence of divisions of his sub-regions, he failed to give them technical names, as at that time uncalled for. The purpose of this paper is to show that the Philippines themselves are separated into several distinct zoological divisions; and it therefore seems necessary, for their study, to give technical names to the primary and secondary divisions of the already recognized sub-regions. The terms 'province' and 'sub-province' seem least objectionable, and will be used here; the Philippine Islands thus forming one of the provinces of the Indo-Malayan sub-region, and the divisions of the group itself sub-provinces.

The zoological province of the Philippines is co-extensive with the political division of the same name, with the exception, perhaps, of the islands of Sulu and Tawi Tawi, which lie between the Philippines and Borneo, but are claimed by the Spanish.

The sub-provinces proposed are, first, the northern Philippines, consisting of Luzon, Marinduque, and a number of other small islands about Luzon; second, Mindoro; third, the central Philip-

pinas, made up of the islands of Panay, Guimaras, Negros, Cebu, Bojol, and Masbate; fourth, the eastern Philippines, comprising the islands of Samar and Leite; fifth, the southern Philippines, embracing the great island of Mindanao, with Basilan; and, sixth, the western Philippines, consisting of the islands of Paragua or Palawan, and Balabac.

The geographical positions of these sub-provinces are fortunately such that these simple names show their relation to each other very closely, as may be seen by consulting a map of the archipelago.

Of these sub-provinces, the western Philippines, made up of Paragua and Balabac, and perhaps the Calamianes, is of most importance, its animal life being much more closely allied to that of Borneo than that of any other sub-province of the group. This is especially noticeable in its mammals, of which it possesses, in common with Borneo, the genera *Tragulus*, *Tupaia*, and *Manis*, which are apparently absent from the rest of the archipelago. Of Bornean genera of birds not found elsewhere in the group, *Jora*, *Criniger*, *Polyphetron*, *Tiga*, and *Batrachostomus* are examples. The sub-province has evidently received a large part of its fauna from North Borneo, through Balabac, and at a comparatively recent date, and since its separation on the north from the rest of the Philippines, so that these genera have not flown over into Mindoro and Luzon. In addition to these apparently late arrivals from Borneo, the sub-province possesses a large number of peculiarly Philippine birds and mammals, which show that it is an integral part of the province.

The rest of the Philippines would seem to have received its Malayan fauna at another time and by the other way of Sulu and Mindanao. They possess the mammalian genera *Galeopithecus*, *Tarsius*, and *Cervus*, which are apparently wanting to the western sub-province, and the genera *Macacus*, *Sus*, *Viverra*, *Paradoxurus*, and *Sciurus* in common with it. Of birds, the genera *Loriculus*, *Cyclopsitta*, *Buceros*, and *Penelopides* are examples which are more or less generally distributed over the archipelago outside of the western sub-province.

The grounds for dividing the Philippines east of Paragua into sub-provinces are to quite an extent based upon species, and especially upon the existence in each of representative forms of the genera *Loriculus*, *Buceros*, *Penelopides*, *Brachyurus*, *Chrysocolaptes*, *Dicæum*, *Cinnyris*, etc. The hornbills form, perhaps, the most striking example of this distribution of representative species. Of the eleven species of hornbills collected in the islands, the western sub-province has one, the southern three, the central two, the eastern two, Mindoro one, and the northern two; and we have found no case of a single species occupying more than one sub-province, or of more than one species of a genus in a single sub-province. The genera *Chrysocolaptes* of woodpeckers is also noticeable, each sub-province possessing its own species, with the exception of Mindoro, which apparently lacks the genus altogether. The genus *Loriculus* of the parrots is of the same character.

Of other animals than birds, the genus *Sciurus* of mammals, and *Draco*, the flying lizards, seem to have representative species in each sub-province, and the land mollusca are probably distributed according to the same plan.

The above examples are a few that come to mind before a careful study of our collections has been made, and they do not by any means represent all the reasons for the conclusions arrived at. These are the result, rather, of the observation of five careful men who have been collecting and studying in the Philippines during the last year. During this time we have visited and collected in fifteen of the islands of the group, and these the largest and most important. I am satisfied that the study of our collections, with the aid of the libraries and collections at home, will only strengthen the conclusions of this paper. It may prove necessary to make the so-called western sub-province of more importance in the arrangement, but the non-existence in nature of exactly equivalent divisions of any kind is well recognized. It is hoped that our work may aid in untangling some of those puzzles in which students of Philippine zoology have found themselves involved, and that it will also add considerably to the sum of knowledge concerning this as yet imperfectly known corner of the earth.

J. B. STEERE.

Manila, July 2.